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Ways of Modernization of Educational System of Building and Construction Specialists in View of Professional Standards Requirements

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Abstract

The article is devoted to problems of quality of professional competences of building and construction specialists in Russian Federation. The authors provide comparative analysis of the national professional education system and other systems of advanced countries. The results of analysis allow identifying the target of modernization of educational system. This research also covers the actions taken by government authorities in Russia that enable the problem solving in terms of quality of professional competences. The authors also show the structure of professionalism management system in construction sphere and suggest the system of interrelation of basic programs of higher professional education and professional retraining with professional communities in construction sphere.

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Keywords: Professional standards, professional education, professional competences.

1. Introduction

Lead establishments of higher professional education pay great attention to the issues of professional training for town planning and housing and communal sector [1-8].

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Integration of Russian educational system into the European in terms of Bologna agreements is not so smooth [9-18] due to problems, among which is the absence of professional standards that measure professional competences of a specialist. Besides, there is no systematic approach in professionalism management, which is typical for economics of advanced states.

The problem of professional competence quality in modern Russia economics and construction sphere is urgent. Specialists of the leading universities in Russia have been working out the ways of its solving for the last ten years [19-23], including innovation education technologies implementation [24-25], as well as creation of effective system of continuing professional education [26-32].

Latest political and economic events, that our country has faced, make famous quotation "It's all about the people" true to life and urgent.

2. Comparative analysis of education systems

The study of international experience in modeling higher education systems in Great Britain, the USA, Canada and Australia demonstrates the same education degrees that an applicant can gain after getting education and conducting research:

- Bachelor engineer degree;
- Master's degree in engineering;
- PhD in engineering.

A degree can be gained in case an applicant has received the previous one, and as a rule, a degree requires work experience in construction sphere and research.

In Russian Federation the law "Education" enacts the following levels of higher professional education:

1) higher education-bachelor degree;
2) higher education – specialist degree, master's degree;
3) higher education – professional training.

Bachelor degree is gained after completion of curriculum, designed by an educational establishment autonomously and based on the Federal State Educational Standard. There is a concise sequence of degree gaining.

In Great Britain engineering profession isn't licensed, but special status of a privileged engineer is required on the part of a graduate to be entitled for autonomous engineering activity. Only non-state professional organization can confer this degree, which is known as the Council of engineers, containing the most authoritative and experienced construction engineers of Great Britain. An applicant should hold master's degree, have 4-5 years of work experience and pass a special interview in the Council of engineers, which evaluates his qualification and record of work performed.

In the USA higher education certificate isn't enough for an engineer to start his professional path. There are additional rules for engineering license in each state that require stage of internship as well as engineering exams. In addition to the license an engineer in the USA should insure his third part liability.

Standard exams were designed for engineers due to private sector efforts. Successful results of these exams in some states are enough for getting a license for a professional construction-engineer. In some states it is required not only to take standard exams, but also additional exams are of great importance.

In Canada and in the USA engineer's performance is a licensable type of activity, and engineer's responsibility is insured. The requirements for getting a license differ depending upon a province and territory, but there exist universal eligibility rules for profession, which are enough for becoming a practicing construction-engineer.

The minimum requirements to an applicant for engineering license:

- earning bachelor's degree in one of the educational establishments, accredited by specialized non-state organization "Engineers of Canada";
- registration of an applicant as an assistant-engineer in an appropriate authority of a province or territory;
- successful internship results of an assistant at engineering works during two years;
- preparation and successful examination results in engineering.

Construction engineers in Canada obtain adequate experience and knowledge, before starting independent professional activity, are responsible for designed and erected constructions and buildings.

In Australia the system of professional competence certification has a lot of common features with British system, but it has its peculiarities.

For submission of a publication for the degree of a privileged engineer a candidate should register in a non-state professional union "Engineers of Australia" immediately after graduating or during the studies. This allows this organization to follow an applicant's career path in order to make a justified decision on awarding of status "privileged engineer".

Having obtained a certain work experience, an applicant can compare his knowledge, skills and abilities with the requirements for becoming a privileged engineer. These requirements are loaded on the web-site "Engineers of Australia".

Following examination of an application, which indicates that he or she responds to each qualification requirements and face-to-face interview with the commission of "Engineers of Australia", a candidate can be awarded an appropriate status.

In most cases, a graduate should have worked 8 years on average, before he can claim for the status of a "privileged engineer" [33].

In Russian Federation documents, evidencing educational level and qualification, are identified by the Federal law "Education".

Education and qualification certificate is issued to verify the following levels and qualification of professional development in a certain profession, specialty or degree program that relates to the existing level of professional education:

1) higher education – bachelor degree course (verified by bachelor diploma or certificate);
2) higher education – specialist degree course (verified by specialist diploma or certificate);
3) higher education – master's degree course (verified by master's diploma or certificate);
4) higher education – top-qualification staff training, that include such programs for academic and teaching staff as post-graduate courses (post graduate military course), clinical studies, assistantship (verified by diploma of post-graduate courses (post graduate military course), clinical studies, assistantship).

The level of professional education and qualification, indicated in the education and qualification documents, gives right to their licentiates to perform certain professional activities and hold positions that conform to necessary legislated requirements to the level of professional education and qualification.

Applicants, who mastered the programs for academic and teaching staff at post-graduate courses (post graduate military course) and upheld expert work (dissertation thesis) according to the legislation of Russian Federation for gaining degree of candidate of sciences in an appropriate academic and research specialty, are also awarded with diploma of candidate of sciences.

The qualification document proves the certification in vocational professional education (professional retraining diploma). The qualification, indicated in qualification document, gives a licentiate right to practice profession or carry out certain work functions that conform to necessary legislated requirements to the level of vocational professional education and qualification.

The levels of education, formulated in Federal law "Education" and documents that justify them don't contradict the above-mentioned approaches to providing quality of professional competences of construction engineers and capital construction projects safety control. The main peculiarity of the above-mentioned systems of higher professional education of construction-engineers differ from the system, accepted in Russian Federation, and is connected with additional verification of professional competences.

Problem of formation national qualification system was identified as the way to solve the problem of professional competences quality. Moreover, there were made amendments in the Russian Federation Labor Code, National Council on professional competences was formed under the patronage of Russian Federation President and was given ample powers.

Development of 107 professional standards is the target task in construction sphere. Council on professional qualifications in construction on the base of National union of construction engineers was created to solve this problem (NOSTROI).

By the year 2014 34 projects of professional standards in construction sphere were developed, 12 of these standards are confirmed by the Ministry of labor and social protection of Russian Federation. The developer of the

professional standards “Hydraulic engineer in construction”, «Assembler of exterior piping» and «Assembler of turbine plant» is Samara state university of architecture and civil engineering, and executives are the authors of this article [34].

It is required to solve a number of tasks of adjusting the programs of training, retraining and qualification-based training in accordance with requirements of professional standards for the shortest period.

Undoubtedly, solving of this problem should bear a systematic character with the following development of the system that manages professional competences of the specialists [35]. Structure of simple system of professionalism management is suggested (Fig 1.) for solving the task of quality assurance of professional competences of specialists in construction sphere.

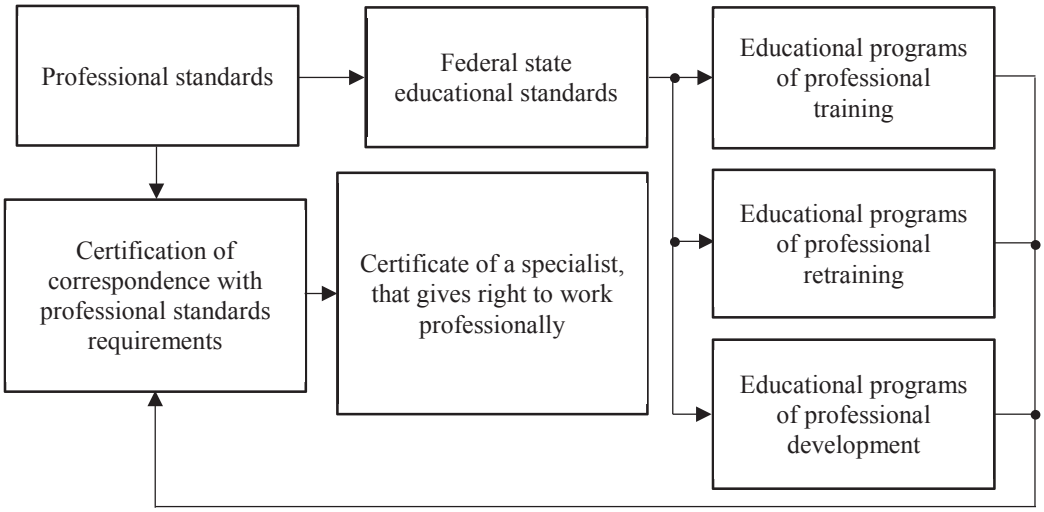

Fig. 1. Structure of simple system of professionalism management

Professional standards serve the base for federal state educational standards development that determines the contents of educational programs of training, retraining and professional development. On completion of the above-mentioned educational programs a specialist should justify his right to conduct professional activity within the stated qualification. This task should be solved by independent system of certification in construction sphere.

Undoubtedly, that the created national system of certification should be based on the principles that will stimulate its integration with European and world systems of certification. This will allow increasing mobility of the labor sources in Russian Federation which is very urgent in conditions of international cooperation of national economy in SCO and BRICS.

The analysis of the requirements of functional professional standard “Construction operations manager” to knowledge and skills of a specialist makes it obvious that the complex of forming of necessary knowledge for performing the majority of professional functions for the fourth qualification level (building site headman) was gained while passing education program “Industrial and civil construction”. However, employers in construction sphere, who cooperate with Samara state university of architecture and civil engineering and also with Samara department of Russian union of construction engineers on the level of self-regulated organizations, think that graduates of construction institutions are not ready enough to perform the maximum of job responsibilities of specialist at the fourth qualification level. In their opinion, this is explained by the lack of required skills on the part of a specialist that are fully covered in the professional standard. Besides that, the standard requirements suggest the experience of practical work in this or that specialty of construction sphere at least for 3 years. There comes a question: Where a young specialist can obtain the required skills and experience?

We consider three alternatives to solve these tasks.

The first alternative can be fulfilled by the institute independently by introducing additional case studies, training courses, business games and other types of activities into the educational programs that are aimed at obtaining required skills. Obviously, it is very hard to prepare a student to perform professional functions to the full extent.

Moreover, limitation of academic load in bachelor's program causes certain difficulties. It is required to add more academic hours.

The second alternative is included into the first one and it implies cooperation of a student with a future employee during the course. The results of the polls show that such approach is supported by employers of medium-sized and large-sized construction business and they express their commitment to take part in practice works organization and employment of students. Samara state university of architecture and civil engineering has experience of teaching practical professions for first and second year students, providing them with the right of professional activity in construction sphere and further construction works during summer externship as well as during the session.

The third alternative combines the first two with vocational program that implies professional retraining and getting the second diploma that gives right to perform a new type of professional activity together with the qualification.

In general, the described approach to develop professional educational programs in view of professional standards requirements is displayed in the flowchart (Fig. 2.)

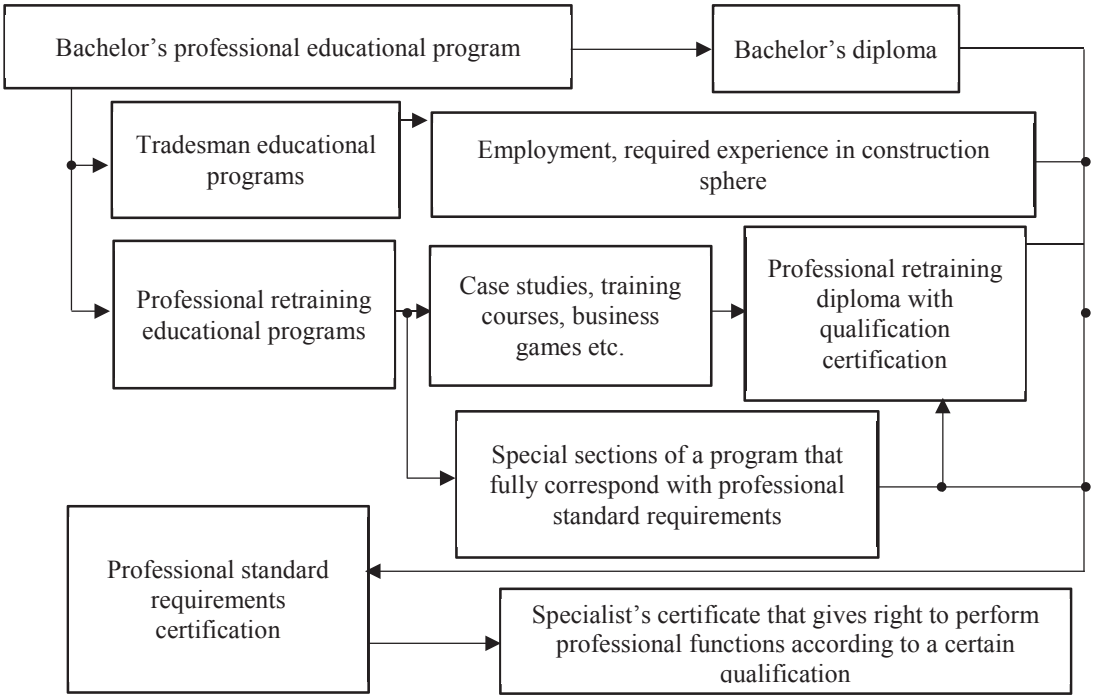

Figure.2. Flowchart of core and vocational professional programs interrelation

3. Summary

Cooperation of existing core and vocational professional education with the professional community which is aimed at obtaining knowledge and skills required by the professional standard and verified by independent certification authority will substantially improve the quality of professional competences of construction specialists in Russia. Consequently it will provide better safety of the designed and erected buildings and constructions and reduce the number of construction objects that don't conform to technical regulations.

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